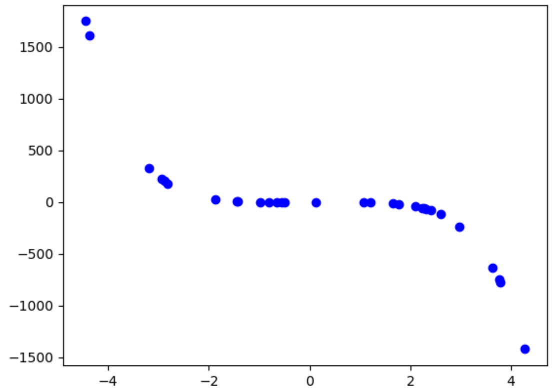
1. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Logarithmic model

C. Linear model

D. Exponential model

E. None of the above

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2. A town has an initial population of 100000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	100040	100080	100120	100160	100200	100240	100280	100320	100

A. Non-Linear Power

B. Linear

C. Exponential

D. Logarithmic

E. None of the above

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3. Using the scenario below, model the population of bacteria α in terms

of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 1 hours, the petri dish has 9 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 55 minutes

B. About 57 minutes

C. About 334 minutes

D. About 347 minutes

E. None of the above

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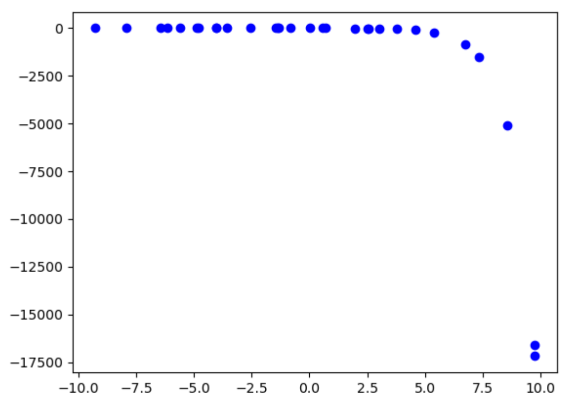
4. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Linear model

D. Logarithmic model

E. None of the above

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5. A town has an initial population of 80000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	79946	79896	79854	79804	79746	79696	79654	79604	79546

A. Logarithmic

B. Linear

C. Exponential

D. Non-Linear Power

E. None of the above

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6. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $150°$ *C and is placed into a* $16°$ *C bath to cool. After 15 minutes, the uranium has cooled to* $90°$ *C.*

A. $k = -0.04710$

B. $k = -0.04774$

C. $k = -0.07606$

D. $k = -0.04865$

E. None of the above

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7. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 784 grams of element X and after 3 years there is 196 grams remaining.

A. About 1 day

B. About 730 days

C. About 1095 days

D. About 365 days

E. None of the above

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8. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

   A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 3 hours, the petri dish has 32876 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

   A. About 43 minutes

   B. About 26 minutes

   C. About 160 minutes

   D. About 258 minutes

   E. None of the above

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9. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

   The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is *initially 925 grams of element X and after 2 years there is 115 grams remaining.*

A. About 730 days

B. About 0 days

C. About 1 day

D. About 0 days

E. None of the above

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10. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 140° *C and is placed into a* 20° *C bath to cool. After 10 minutes, the uranium has cooled to* 89° *C.*

A. $k = -0.07126$

B. $k = -0.05534$

C. $k = -0.07316$

D. $k = -0.07075$

E. None of the above
